

# The Delphin 2 Autonomous Underwater Vehicle

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The Delphin 2 Autonomous Underwater Vehicle (AUV) is a small (<2m) highly manoeuvrable submersible, designed to undertake complex missions which require it to autonomously interact with the subsea environment with no external connections for power or control. It is the culmination of five years of work by PhD and Masters level students at the University of Southampton under the supervision of researchers at the University of Southampton and the National Oceanography Centre, Southampton. The AUV has been designed to both compete in the Student Autonomous Underwater Challenge – Europe (SAUC-E) and to provide a research platform to investigate AUV manoeuvring and control.

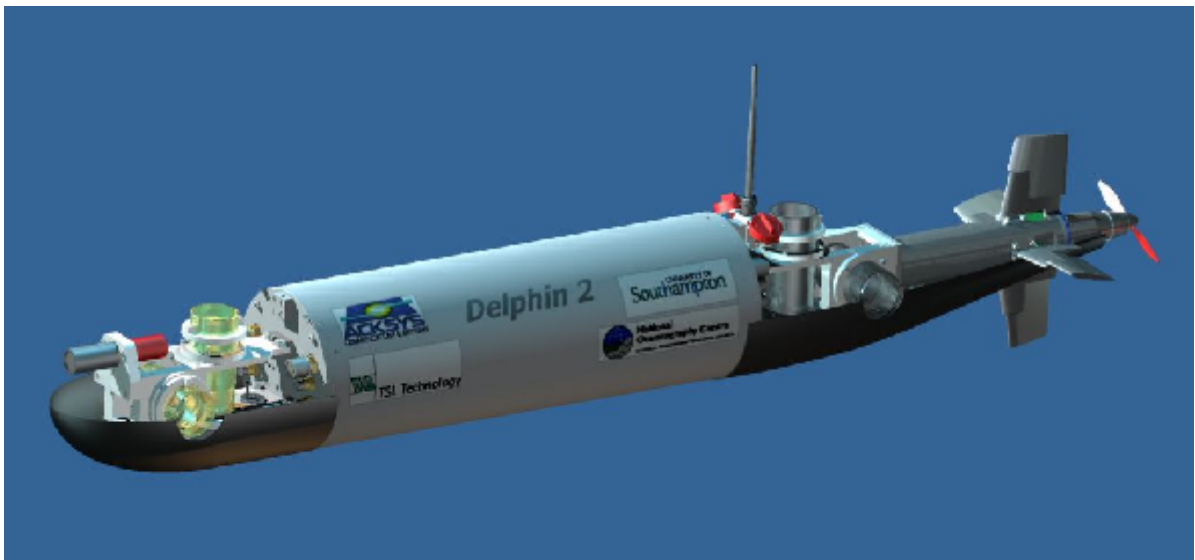


Figure 1. A solid model rendering of the Delphin 2 Autonomous Underwater Vehicle being developed by students and researchers at the University of Southampton and the National Oceanography Centre, Southampton.

The AUV is shown in Figure 1, forwards propulsion is provided by a rear mounted propeller powered by a 50W Maxon brushed DC motor. Manoeuvring in the horizontal and vertical planes is achieved using four through body tunnel thrusters (two vertical and two horizontal) for hovering and slow speed manoeuvring, and aft mounted active control planes for more conventional higher speed flight modes. This configuration provides a very flexible platform for AUV research.

The central section of the AUV a cylindrical aluminium pressure vessel (rated to 50m water depth) which houses the main electronics and the battery. The powerful onboard computer provides an excellent system for control research and allows complex analysis of both the onboard sonar systems and video camera data, thereby enhancing the AUV's awareness of its local terrain. While the large nickel metal hydride (NiMH) battery pack within the AUV means that it can perform missions of approximately 4-5 hours duration before needing to recharge. This gives ample time to undertake the complex missions for which it has been designed.

The electronics layout within the main pressure housing is shown in Figure 2. This illustrates the location of the control PC (a Kontron 986LCD mini-ITX board), the motor control boards (a TSL technology tunnel thrusters control board and a barracuda motor control board), the video grabber board for the cameras, and the Acksys (WLg-LINK-OEM) WiFi module. This module was chosen as it provides a compact, reliable and high powered wireless connection to the internal PC, allowing the operator to communicate with the AUV while surfaced from the shore or support boat. Since seawater blocks the WiFi signal when the vehicle is submerged it is crucial to have reliable wireless communications when on the surface to allow the operator to plan missions and post process mission logs.

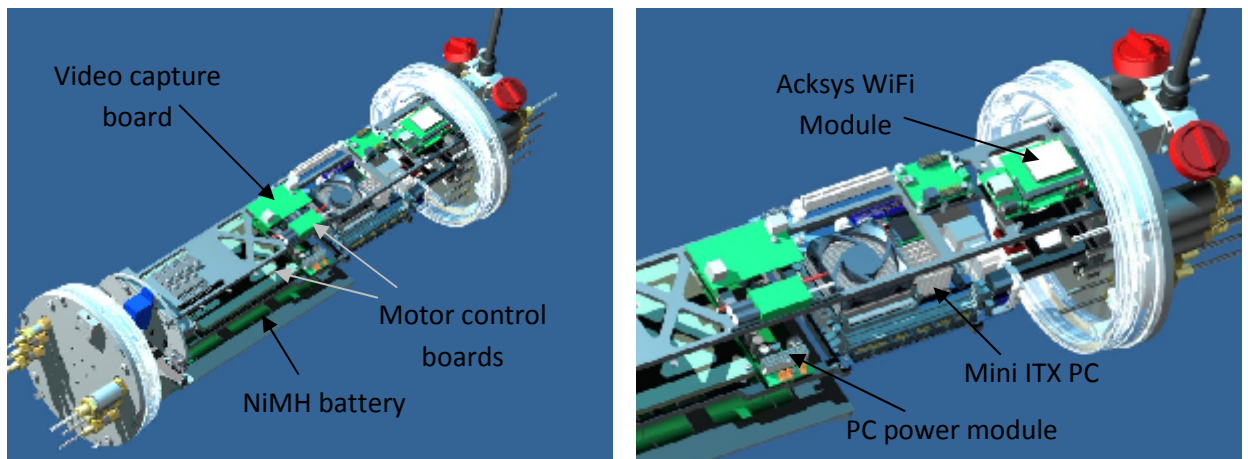


Figure 2. A solid model renderings of the internal electronics of the Delphin2 Autonomous Underwater Vehicle showing the main PC, battery pack, motor controllers, the Acksys wiFi module, and the video capture board.

The AUV team would like to thank Acksys for their support with the wireless module, TSL technology for their support in providing the tunnel thrusters and control board, and the National Oceanography Centre and the University of Southampton for the support of staff and the provision of equipment and facilities.

#### **Team Members (students and supervisors)**

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